



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/689,001	10/20/2003	Gayatri Vyas	8540G-236COA	4101
27572	7590	10/30/2008		
HARNESS, DICKEY & PIERCE, P.L.C.				
P.O. BOX 828				
BLOOMFIELD HILLS, MI 48303				
EXAMINER				
ALEJANDRO, RAYMOND				
ART UNIT		PAPER NUMBER		
1795				
MAIL DATE		DELIVERY MODE		
10/30/2008		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/689,001

**Applicant(s)**

VYAS ET AL.

**Examiner**

Raymond Alejandro

**Art Unit**

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 10/20/08.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-25, 29-53 and 55-58 is/are pending in the application.
- 4a) Of the above claim(s) 23-25 and 29-53 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-22 and 55-58 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☒ Certified copies of the priority documents have been received in Application No. 10/004322.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(c), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(c) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/20/08 has been entered.

This office communication is provided in reply to the amendment accompanying the foregoing RCE. The claim objections and the 35 USC 112 rejection have been overcome. However, applicant's amendments have not yet overcome the prior art rejections as set forth in the prior office action. Refer to the above-mentioned amendment for details concerning applicant's rebuttal arguments and remarks. Therefore, all pending claims are finally rejected over the same grounds of rejection as formulated hereunder and for the reasons of record:

### ***Election/Restrictions and Claim Disposition***

1. Claims 23-25 and 29-53 have been withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention/species, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 07/20/06.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).
4. Claims 1-3, 13-15, 18-22 and 55-58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al 5624769 in view of Gordon 4146657.

The present application is aimed at an electrochemical cell wherein the disclosed inventive concept is a the specific metal oxide coating applied to an electrically conductive contact element.

Concerning claims 1 and 55:

Li et al disclose a **PEM (proton exchange membrane) fuel cell** (Abstract) comprising a membrane electrode assembly (reference numeral 4, 6) comprising a solid polymer membrane electrolyte having an anode on one face of the membrane electrolyte and a cathode on the opposite side thereof; the membrane electrode assembly being sandwiched between a pair of

Art Unit: 1795

electrically conductive elements (bipolar septum/plate 8, or end contact plates 14, 16) serving as current collectors for the anode/cathode and containing appropriate channels and openings therein for distributing the gaseous reactants (i.e. hydrogen and oxidant-air) over the surfaces of the respective anode and cathode (COL 1, lines 15-27/COL 2, line 52 to COL 3, line 5/CLAIM 1/FIGURE 1). *The structure of the channels also encompasses the presence of a plurality of lands.* Gas permeable carbon current collectors 34, 36, 38 and 40 (gas diffusion element) are disclosed (COL 2, line 64 to COL 3, line 2). Additionally, the electrically conductive element (i.e. bipolar/septum 8) presses up against gas permeable carbon current collectors 36 and 38 (COL 3, lines 10-17/ FIGURE 1). *Therefore, the anode sides and cathodes sides of the membrane electrode assembly are in direct contact with the electrically conductive elements 8, 14 and 16 (bipolar septum/plate).*

**EMPHASIS ADDED ↓:**

**Disclosure A:** Li et al discloses the formation of an oxide films on the surfaces of the contact elements made from Al or Ti (COL 1, line 65 to COL 2, line 3).

**Disclosure B:** Li et al also disclose and illustrates bipolar septum/plate 8 or end contact elements 14 and 16 comprising a core 50 of a metal such as Al or Ti; a barrier/protective layer 52 of a metal which forms a passivating oxide film being deposited on the core 50, and is cover with a topcoat of Ti-nitride 54 (COL 3, lines 17-33). More importantly, disclosed therein is that the Ti-nitride topcoat is a micro-discontinuous coat having a plurality of defects therein exposing said protective coating to a corrosive operating environment (CLAIM 1 & CLAIM 3)

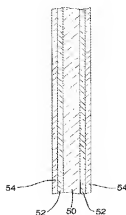


FIG. 2

As evident from **Disclosure A** above, conventional fuel cells have an oxide film on the surfaces of the contact elements made from Al or Ti. *Thus, the contact elements have thereon a film made of either Al-oxide or Ti-oxide.*

As further evident from **Disclosure B** above, the micro-discontinuous Ti-nitride topcoat has a plurality of defects therein exposing the barrier/protective metal layer 52 to the electrodes.

*Thus, one way or another, **Disclosure A** or **Disclosure B**, alone or in combination, fully support having a non-ferrous metal-oxide coating in direct contact with the gaseous reactants and the electrode part of the membrane electrode assembly.*

Concerning claims 3, 15 and 58:

Contact element is made of either Al or Ti (COL 1, line 65 to COL 2, line 3); OR bipolar septum/plate 8 or end contact elements 14 and 16 comprise a core 50 of a metal such as Al or Ti (COL 3, lines 17-33). *These metals are susceptible to corrosion.* Passivating oxide film 52 inhibits corrosion (CO 3, lines 23-32) or Al has the ability to passivate against corrosion (COL 3, lines 50-56).

Art Unit: 1795

As to claim 12:

Disclosed is the use of a carbon cloth placed between the electrode sides (anode side and cathode side) of the membrane electrode and the bipolar septum/plate or end contact elements (COL 2, line 64 to COL 3, line 3/ COL 3, lines 10-15/ FIGURE 1).

Concerning claims 13 and 18-21:

The pair of electrically conductive elements (bipolar septum/plate 8, or end contact plates 14, 16) contains appropriate channels and openings (reference numeral 18, 20, 22 , 24) therein for distributing the gaseous reactants (i.e. hydrogen and oxidant-air) over the surfaces of the respective anode and cathode (COL 1, lines 15-27/COL 2, line 52 to COL 3, line 5/CLAIM 1/FIGURE 1).

Li et al discloses an electrochemical cell according to the aspects mentioned above. However, the preceding prior art does not expressly disclose the specific fluorine doped tin oxide film.

As to claims 1-2, 14, 22 and 56-57:

Gordon discloses electrically conductive films of tin oxide comprising fluorine (ABSTRACT/COL 1, lines 5-25); fluorine doped stannic oxide (COL 2, lines 38-42). The coating is an electrically conductive coating (COL 1, lines 24-28/COL 2, lines 38-42) finding application in electrochemical systems or environments (COL 1, lines 12-18). The film material also exhibits good match of thermal expansion coefficient (COL 9, lines 33-42). The film includes 1-2.5 % of fluorine (COL 7, lines 10-12).

**Examiner's note:** *since Gordon discloses a fluorine-tin based oxide as a coating material, it is contended that Gordon's coating material inherently possesses the claimed*

*resistivity. Accordingly, products of identical chemical composition can not have mutually exclusive properties, and thus, the claimed property (i.e. the claimed bulk resistance), is necessarily present in the prior art material. It is to be noted that applicant's coating having a resistivity of less than .001 ohm-cm is made of a doped metal oxide composition comprising fluorine-doped tin oxide; and applicant's coating composition is the same as that of Gordon.*

*"Products of identical chemical composition can not have mutually exclusive properties." A chemical composition and its properties are inseparable. Therefore, if the prior art teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present. In re Spada, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).*

***See MPEP 2112.01 [R-3] Composition, Product, and Apparatus Claims***

In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the field of invention at the time the invention was made to use the specific fluorine doped tin oxide of Gordon in the electrochemical cell of Li et al because Gordon directly teaches that such specific oxide films find application in electrochemical systems or environments due to their high electrical conductivity and suitable thermal expansion coefficient. *Additionally, the teachings of Gordon and Li et al are fully pertinent to one another and the field of applicant's endeavor because Gordon is strictly concerned with providing a suitable electrically conductive layer to reduce electrical resistance in power generating devices such as a solar cell or in electrical devices. Thus, Gordon addresses the same technical difficulties confronted by both Li et al and applicant including a reduction in electrical resistance in electrical or power generation applications.* In anticipation of applicant's response that there is no specific suggestion or teaching in the references to combine prior art, the examiner responds



Art Unit: 1795

that a decision of Supreme Court in *KSR International Co. v. Teflex Inc.*, 550 US, 82 USPQ2d 1385 (2007) forecloses the argument that a specific teaching, suggestion or motivation is required to support a finding of obviousness. See also recent Board decision *Ex Parte Smith*, USPQ2d, slip op. at 20 (Bd. Pat. App. & Interf. June 25, 2007) citing *KSR*, 82 USPQ2d at 1396.

5. (At least) Claims 1-2 and 55-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gyoten et al 7005205 in view of Gordon 4146657.

As to claims 1 and 55:

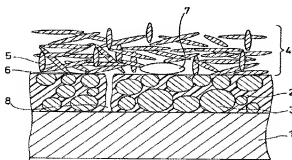
Gyoten et al disclose a **polymer electrolyte fuel cell** (*same as proton exchange membrane fuel cell*) having an electrolyte membrane electrode assembly having a polymer electrolyte membrane, and a pair of gas-diffusion electrodes sandwiching the polymer electrolyte membrane (ABSTRACT & COL 1, lines 15-25), and further comprising first and second electroconductive separators having a metal substrate and an electroconductive resin layer thereon and contacting the electrolyte membrane assembly (ABSTRACT/COL 3, lines 19-26). Gyoten et al disclose the inclusion of an electroconductive separator for affixing the MEA, and interconnecting in series neighboring MEAs having gas-supplying channels for the fuel gas and the oxidant gas to the gas-diffusion electrodes (COL 1, lines 29-34). *The structure of the channels also encompasses the presence of a plurality of lands.*

**1<sup>st</sup> approach:** it is imperative to note that the electroconductive resin layer incorporates therein an electroconductive particulate substance (COL 4, lines 5-15) and powders of metal oxide such as Ru-oxide are effective as the electroconductive particulate substance (COL 4, lines

Art Unit: 1795

15-21). As depicted in **Figure 1** below, electro-conductive particles 3 are dispersed in the electroconductive resin layer 2 and direct contact gas diffusion electrode 4 (See Figure 1/ COL 6, lines 12-30). Thus, Ru-metal oxide particles directly contact the electrode 4.

FIG. 1



**2<sup>nd</sup> approach:** Additionally, there is embodied in **Embodied Example 6** having a metal oxide layer between the metal substrate and the resin layer (EMBODIED EXAMPLE 6, COL 8, lines 35-52). *The electrically conductive property of the metal oxide film is inherent to the composition itself.* Gyoten et al teach that the oxide layer is situated between the metal substrate 1 and said electroconductive resin layer 2 (COL 8, lines 48-52/CLAIM 2). Notice also the presence of pin-hole 8 and gas diffusion electrode 4 (See FIGURE 1/COL 6, lines 12-30). *Given that pin-hole 8 directly provides an open path therebetween, it can be said that reactant gas diffusing through gas diffusion electrode also diffuses through the electroconductive resin layer 2. Therefore, said reactant gas contacts or communicates with the oxide layer placed between the metal substrate 1 and said electroconductive resin layer 2.*

Gyoten et al discloses an electrochemical cell according to the aspects mentioned above. However, the preceding prior art does not expressly disclose the specific fluorine doped tin oxide film.

As to claims 1-2 and 56-57:

Gordon discloses electrically conductive films of tin oxide comprising fluorine (ABSTRACT/COL 1, lines 5-25); fluorine doped stannic oxide (COL 2, lines 38-42). The coating is an electrically conductive coating (COL 1, lines 24-28/COL 2, lines 38-42) finding application in electrochemical systems or environments (COL 1, lines 12-18). The film material also exhibits good match of thermal expansion coefficient (COL 9, lines 33-42). The film includes 1-2.5 % of fluorine (COL 7, lines 10-12).

***Examiner's note:*** since Gordon discloses a fluorine-tin based oxide as a coating material, it is contended that Gordon's coating material inherently possesses the claimed resistivity. Accordingly, products of identical chemical composition can not have mutually exclusive properties, and thus, the claimed property (i.e. the claimed bulk resistance), is necessarily present in the prior art material. It is to be noted that applicant's coating having a resistivity of less than .001 ohm-cm is made of a doped metal oxide composition comprising fluorine-doped tin oxide; and applicant's coating composition is the same as that of Gordon.

"Products of identical chemical composition can not have mutually exclusive properties." A chemical composition and its properties are inseparable. Therefore, if the prior art teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present. In re Spada, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).  
**See MPEP 2112.01 [R-3] Composition, Product, and Apparatus Claims**

In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the field of invention at the time the invention was made to use the specific fluorine doped tin oxide of Gordon in the electrochemical cell of Gyoten et al because Gordon directly teaches that such specific oxide films find application in electrochemical systems or environments due to their high electrical conductivity and suitable thermal expansion coefficient. *Additionally, the teachings of Gordon and Gyoten et al are fully pertinent to one another and the field of applicant's endeavor because Gordon is strictly concerned with providing a suitable electrically conductive layer to reduce electrical resistance in power generating devices such as a solar cell or in electrical devices. Thus, Gordon addresses the same technical difficulties confronted by both Gyoten et al and applicant including a reduction in electrical resistance in electrical or power generation applications.* In anticipation of applicant's response that there is no specific suggestion or teaching in the references to combine prior art, the examiner responds that a decision of Supreme Court in ***KSR International Co. v. Teflex Inc.***, 550 US, 82 USPQ2d 1385 (2007) forecloses the argument that a specific teaching, suggestion or motivation is required to support a finding of obviousness. See also recent Board decision ***Ex Parte Smith***, USPQ2d, slip op. at 20 (Bd. Pat. App. & Interf. June 25, 2007) citing ***KSR***, 82 USPQ2d at 1396.

Art Unit: 1795

6. Claims 4-12 and 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al 5624769 in view of Gordon 4146657 as applied to claim 1 above, and further in view of Applicant's Admitted Prior Art (heretofore 'the AAPA').

Li et al and Gordon are both applied, argued and incorporated herein for the reasons expressed above.

As to claims 9-10:

Li et al discloses the formation of an oxide films on the surfaces of the contact elements made from Al or Ti (COL 1, line 65 to COL 2, line 3). Li et al also disclose and illustrates bipolar septum/plate 8 or end contact elements 14 and 16 comprising a core 50 of a metal such as Al or Ti; a barrier/protective layer 52 of a metal which forms a passivating oxide film being deposited on the core 50 (COL 3, lines 17-33).

As to claim 11:

*As to the method limitation, i.e. the welded or braised metal sheet, it is noted that a method limitation incorporated into a product claim does not patentable distinguish the product because what is given patentably consideration is the product itself and not the manner in which the product was made. Therefore, the patentability of a product is independent of how it was made.*

However, the preceding prior art does not expressly disclose the specific particle-binder matrix or graphite-filler-matrix substrates; and the specific conductive open cell foam layer.

As to claims 4-5 and 12:

The AAPA discloses that substrate forming the contact element comprises an electrically conductive composite material being a polymer having conductive powder embedded therein,

Art Unit: 1795

wherein the conductive particles are typically graphite carbon or metal (*Applicant's specification at paragraphs 0076*). Further disclosed is the inclusion of one or more layers disposed between the coating and the substrate, or the substrate itself having multiple layers (*Applicant's specification at paragraphs 0075*).

As to claims 6-8 and 16-17:

The AAPA mentions the use of a bipolar plate featuring a thin barrier sheet including foam and having a thickness which is being attached by welding or brazing; and forming fluid flow fields. Such a foam has opposed surfaces, is electrically conductive; it can be prepared as metal foams or carbon-based graphite foams (*Applicant's specification at paragraph 0077*).

In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the field of invention at the time the invention was made to use the specific particle-binder matrix or graphite-filler-matrix substrates of the AAPA in the electrochemical cell of Li et al and Gordon as the AAPA discloses such specific substrates enhance electrical contact between the composite element and the next adjacent fuel cell element. Thus, electrical conductivity and contact is improved.

With respect to the specific conductive open cell foam layer, it would have been obvious to a person possessing a level of ordinary skill in the field of invention at the time the invention was made to use the specific conductive open cell foam layer of the AAPA in the electrochemical cell of Li et al and Gordon as the AAPA teaches that such a foam layer forms an electrically conductive element. Thus, electrical conductivity and contact is improved.

***Response to Arguments***

7. Applicant's arguments filed 10/20/08 have been fully considered but the Examiner still remains unpersuaded.
8. With respect to the channels and their respective lands, Li et al'769 teach a pair of electrically conductive elements (bipolar septum/plate 8, or end contact plates 14, 16) serving as current collectors for the anode/cathode and containing appropriate channels and openings therein for distributing the gaseous reactants (i.e. hydrogen and oxidant-air) over the surfaces of the respective anode and cathode (COL 1, lines 15-27/COL 2, line 52 to COL 3, line 5/CLAIM 1/FIGURE 1). *The structure of the channels also encompasses the presence of a plurality of lands.* Gas permeable carbon current collectors 34, 36, 38 and 40 (gas diffusion element) are disclosed (COL 2, line 64 to COL 3, line 2). Additionally, the electrically conductive element (i.e. bipolar/septum 8) presses up against gas permeable carbon current collectors 36 and 38 (COL 3, lines 10-17/ FIGURE 1). Therefore, the anode sides and cathodes sides of the membrane electrode assembly are in direct contact with the electrically conductive elements 8, 14 and 16 (bipolar septum/plate). Similarly, Gyoten et al'205 disclose the inclusion of an electro-conductive separator for affixing the MEA, and interconnecting in series neighboring MEAs having gas-supplying channels for the fuel gas and the oxidant gas to the gas-diffusion electrodes (COL 1, lines 29-34). *The structure of the channels also encompasses the presence of a plurality of lands.*
9. In response to applicant's argument that the references are nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order

to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, the examiner has explained in detail how pertinent one reference is to the other, see rejections supra and discussion infra. In this respect, applicant is kindly reminded that a recitation of an invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

10. With respect to the term "*contiguous*", it bears noting that its meaning within the claimed invention is not very clear because such a term only means "adjacent", "neighboring", "bordering", "adjoining" or the like but it does not further limit the claims to have a "*continuous*" coating "*fully*" covering the plurality of lands as apparently argued by the applicant. Since the prior of record discloses segmented coating portions, it can be said that those portions still read on applicant's claimed invention. And in light of a specific dimension associated with the length of the claimed coating, it is practically impossible to ascertain the intended structural impact of the so claimed limitation "*contiguously*" covering. Unless the term is defined in the specification, there is currently no reasonable definition of how such a limitation should be construed in the context of the claimed invention.

11. As far as applicant's arguments related to the "fuel cell" where applicant has contended that the preamble to the claims contains the language "fuel cell", the examiner does not fully comprehend what is the point of raising such an argument because both primary references are strictly related to FUEL CELLS. For instance, the substance of the Li et al'769 disclosure openly and clearly discloses fuel cell systems. The same goes for Gyoten et al'205. Therefore, it should



Art Unit: 1795

be vehemently clear that there is no reason to argue that the prior art of record, alone, singly, together or in combination does not teach, disclose, suggest, and/or show fuel cells. This point is not well-taken by the examiner.

12. With regard to the claiming of unexpected results, those unexpected results are not truly representative of the claimed invention, and thus, they are not commensurate with the scope of the present subject matter. As such, applicant's assertion of unexpected results have been re-evaluated but still found ineffective to overcome the prima facie case of obviousness as set forth above. For instance, in the declaration dated 02/21/08, applicant discusses "*a bipolar plate assembly*", "*fuel cell*", "*metallic substrate*", "*PEM membrane*" and specific "*doping level*" and attributes certain unexpected results to embodiments/fuel cell system comprising the same.

FINE. However, a close examination of the present claims pronouncedly reveals that the present claims clearly omit most of these features and/or elements. Therefore, no unexpected result can be attributed to applicant's electrochemical cell as instantly claimed because it does not contain the same elements/features found to impart unexpected results to the embodiment or fuel cell system described in the foregoing declaration. Thus, applicant's secondary evidence of non-obviousness is not commensurate in scope with the present claims. In other words, the specific structural and material embodiment exhibiting the so-called unexpected results does not fully circumscribe the invention in question. Thus, it cannot be said that the invention in question is also capable of possessing those superior characteristics.

13. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so

Art Unit: 1795

long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

14. The basis of applicant's traversal appears to be premised on three principal points:

(a) *"it would not be obvious to combine the teachings of Gordon with either Li et al or Gyoten et al"* (*"there is no motivation to combine the teachings of Gordon with either Li et al or Gyoten et al"*) especially now that *"Amended claims 1 and 55 recite structure for a PEM fuel cell..."* and based on applicant's seven (7) comments made in the paragraph bridging pages 16-17 of the 06/12/08 amendment;

(b) *"replacing the sporadic deposits disclosed by Li et al and Gyoten et al with the composition disclosed by Gordon does not yield a coating which covers major working surface of the contact element"*;

(c) *"replacing the barrier protective layer disclosed by Li et al and Gyoten et al does not yield a coating which has a substantial portion of the coating in direct contact with a reactant gas"*.

15. In reply to point (a): in response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21

USPQ2d 1941 (Fed. Cir. 1992). In this case, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. (*Emphasis added*) Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). Additionally, in response to applicant's arguments that there is no specific suggestion or teaching in the references to combine prior art, the examiner responds that a decision of Supreme Court in *KSR International Co. v. Teflex Inc.*, 550 US, 82 USPQ2d 1385 (2007) forecloses the argument that a specific teaching, suggestion or motivation is required to support a finding of obviousness. See also recent Board decision *Ex Parte Smith*, USPQ2d, *slip op.* at 20 (Bd. Pat. App. & Interf. June 25, 2007) citing *KSR*, 82 USPQ2d at 1396.

With respect to "structure for a PEM fuel cell", the prior art of record fully meets the requirement of showing a proton exchange membrane fuel cell. Li et al disclose a **PEM (proton exchange membrane) fuel cell** (Abstract); and Gyoten et al disclose a **polymer electrolyte fuel cell** (*same as proton exchange membrane fuel cell*) having an electrolyte membrane electrode assembly having a polymer electrolyte membrane (ABSTRACT & COL 1, lines 15-25)

16. In reply to point (b): to better understand the implication of that limitation, let's take a closer look at what the present claims recite: (claims 1 and 55) "*having an electrically conductive coating deposited on and covering said major working surface*". As seen in the preceding sentence, the recitation only requires that the coating covers said major working surface but it does not stipulate whether the covering is in-part (partly or partially or just a portion) or in-full (fully or in its entirety). Thus, it is the position of the examiner that the foregoing limitation does

Art Unit: 1795

not put forth that the "**entire surface of said major working surface is covered by the coating**" as apparently argued by the applicant. In addition, all transitional phrases in independent claims 1 and 55 are open-ended, and DO NOT exclude various possibilities such as an embodiment "*having an electrically conductive coating deposited on and **partially or partly covering** said major working surface*". The Examiner's position is not unreasonable in view of applicant's amendment to claims 1 and 55, few lines below, where applicant intends to claim subject matter in terms of a part or a portion (in part, portion, partially) and/or entirety (entire, all). The examiner is making reference to the limitation "*substantial portion*".

17. With respect to the extent of the surface covered by the coating, it is helpful to note that both primary references (Li et al and Gyoten et al) teach that "*the barrier protective layer is exposed to the reactant gas through discontinuities or pinholes in the topcoat layer*" wherein the "*discontinuities or pinholes in the topcoat layer*" indeed represent applicant's "*covered portion*". Consequently, the discontinuities or pinholes in the topcoat layer of both Li et al and Gyoten et al fully account for substantial portions in contact with the reactant gas. Interestingly, applicant's arguments (see page 15 of the 06/12/08 amendment, last full paragraph) appears to be an admission on the record that Li et al and Gyoten et al disclose that "*the barrier protective layer is exposed to the reactant gas through discontinuities or pinholes in the topcoat layer*".

18. Applicant has substantially maintained the line of arguments previously advanced, and have questioned the validity of the teachings of Gordon et al simply because Gordon et al does not disclose what applicant calls a fuel cell environment. Well, the fact is that applicant neither claims a fuel cell system. At most, applicant's invention is related to an electrochemical cell per se (see applicant's claims). While the teachings of Gordon may appear to be irrelevant for the

applicant it should be noted that Gordon et al has been cited by the Examiner for teaching that fluorine doped tin oxide films can be used in electrochemical systems or environments as instantly claimed. Therefore, Gordon et al is of technical importance for those skilled in the art seeking to coat or deposit a layer an electrically conductive contact element. Therefore, it is well to note that Gordon directly teaches the use of specific oxide films in electrochemical systems and/or applications due to their high electrical conductivity and suitable thermal expansion. Regardless of the intended use of Gordon et al films, the technical fact is that Gordon et al expressly communicate their intent to use the fluorine doped tin oxide films for coating surfaces of electrochemical components. That is how the Examiner is interpreting the teachings of Gordon et al.

19. Applicant has contended the Examiner's statement concerning how pertinent Gordon et al and Li are to each other and the field of applicant's endeavor. However, applicant appears to side with the Examiner's position as applicant does admit that "*Gordon may be concerned with providing a suitable electrically conductive layer to reduce electrical resistance in power generating devices such as a sola cell or the like*" (See amendment dated 02/21/08 paragraph bridging pages 16-17). In this respect, because Gordon et al show such a characteristic, it can be said that Gordon et al is suitable for any other power generating device comprising a unit cell such as a fuel cell.

20. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., bipolar *plate*, *fuel cell*) are not recited in the rejected claim(s). Although the claims are interpreted in light of

the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

21. Applicant has contended that “*The applications to which Gordon is directed, namely solar cells and photoelectrochemical cells, are no reasonably pertinent to the field of PEM fuel cells*”, “*The technical difficulties presented by the PEM fuel cell of applicant's invention are substantially different from the technical difficulties addressed by the Gordon reference*”, “*The knowledge possessed by one skill in the art of PEM fuel cells and the prior art, including the art relied on by the Examiner, teach away from the Applicant's use of metal oxides in the bipolar plate of a fuel cell*” and “*The metal oxide layer claimed by Applicants does not merely perform the same function as the metal oxide layer disclosed by Gordon but produces results unexpected of metal oxide layers*”. In sum, applicant appears to be questioning the grounds of rejection based solely upon the pertinence of one reference with respect to the other. Nevertheless, applicant is respectfully reminded that in response to applicant's argument that there is no specific suggestion or teaching in the references to combine prior art, a decision of Supreme Court in **KSR International Co. v. Teflex Inc.**, 550 US, 82 USPQ2d 1385 (2007) forecloses the argument that a specific teaching, suggestion or motivation is required to support a finding of obviousness. See also recent Board decision **Ex Parte Smith**, USPQ2d, slip op. at 20 (Bd. Pat. App. & Interf. June 25, 2007) citing **KSR**, 82 USPQ2d at 1396. The Examiner's position concerning the applicability of the KSR legal decision prevails for the reasons of record.

All the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in

Art Unit: 1795

the art at the time of the invention. Stated differently, combining prior art elements according to known methods to yield predictable results is prima-facie obvious. *KSR International Co. v. Teleflex Inc.*, 550 US- 82 USPQ2d 1385, 1396 (2007). *The predictable result is the high conductivity and good matching of thermal expansion coefficient offered by Gordon's film made of the fluorine doped tin oxide.*

The present claims are obvious because the technique for improving a particular class of devices was part of the ordinary capabilities of a person of ordinary skill in the art, in view of the teaching of the technique for improvement in other situations. Stated differently, use of known technique to improve similar devices (methods, or products) in the same way is prima-facie obvious. *KSR International Co. v. Teleflex Inc.*, 550 US- 82 USPQ2d 1385, 1396 (2007). *The improvement is the high conductivity and good matching of thermal expansion coefficient offered by Gordon's film made of the fluorine doped tin oxide.*

The present claims are obvious because a particular known technique was recognized as part of the ordinary capabilities of one skilled in the art. Stated differently, applying a known technique to a known device (methods or product) ready for improvement to yield predictable results is prima-facie obvious. *KSR International Co. v. Teleflex Inc.*, 550 US- 82 USPQ2d 1385, 1396 (2007). *The predictable result is the high conductivity and good matching of thermal expansion coefficient offered by Gordon's film made of the fluorine doped tin oxide.*

The present claims are obvious because a person of ordinary skill in the art would have been motivated to combine the prior art to achieve the claimed invention and that there would have been a reasonable expectation of success. Stated differently, some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art

reference or to combine prior art reference teachings to arrive at the claimed invention renders the claimed invention prima-facie obvious. *KSR International Co. v. Teleflex Inc.*, 550 US- 82 USPQ2d 1385, 1396 (2007). It is thus obvious to one of ordinary skill in the art to include the fluorine-doped tin oxide disclosed in the Gordon reference in the electrochemical cell (fuel cell) of either the Li et al or the Gyoten et al reference to achieve the claimed invention. As disclosed in the Gordon reference, the fluorine-doped tin oxide film (coating) exhibits good electrical conductivity and good match of thermal expansion coefficient. Thus, the motivation for the combination would be to increase conductivity and better match thermal expansion coefficient.

Moreover, the teachings of Gordon and Li et al or Gyoten et al are fully pertinent to one another and the field of applicant's endeavor because Gordon is strictly concerned with providing a suitable electrically conductive layer to reduce electrical resistance in power generating devices such as a solar cell or in electrical devices. Thus, Gordon addresses the same technical difficulties confronted by both Li et al or Gyoten et al and applicant including a reduction in electrical resistance in electrical or power generation applications.

22. Since Gordon discloses a fluorine-tin based oxide as a coating material, it is contended that Gordon's coating material inherently possesses the claimed resistivity. Accordingly, products of identical chemical composition can not have mutually exclusive properties, and thus, the claimed property (i.e. the claimed bulk resistance), is necessarily present in the prior art material. It is to be noted that applicant's coating having a resistivity of less than .001 ohm-cm is made of a doped metal oxide composition comprising fluorine-doped tin oxide; and applicant's coating composition is the same as that of Gordon. Therefore, Gordon's film composition necessarily exhibits the same degree of resistivity.



*“Products of identical chemical composition can not have mutually exclusive properties.” A chemical composition and its properties are inseparable. Therefore, if the prior art teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present. In re Spada, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). See MPEP 2112.01 [R-3] Composition, Product, and Apparatus Claims.*

**- MPEP 2112.01 [R-3] Composition, Product, and Apparatus Claims:**

*I. PRODUCT AND APPARATUS CLAIMS — WHEN THE STRUCTURE RECITED IN THE REFERENCE IS SUBSTANTIALLY IDENTICAL TO THAT OF THE CLAIMS, CLAIMED PROPERTIES OR FUNCTIONS ARE PRESUMED TO BE INHERENT.*

*Where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a prima facie case of either anticipation or obviousness has been established. In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). “When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not.” In re Spada, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).*

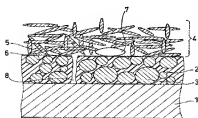
*The following responses to applicant’s argument were postulated in a prior office action and is repeated herein for the reasons of record:*

23. With respect to applicant’s arguments that Gyoten et al’205 do not disclose the claimed invention:

**1<sup>st</sup> approach:** in this respect, (*emphasis supplied*→) it is imperative to note that electroconductive resin layer 2 incorporates therein an electroconductive particulate substance

(COL 4, lines 5-15) and powders of metal oxide such as Ru-oxide are effective as the electroconductive particulate substance (COL 4, lines 15-21). As depicted in **Figure 1** below, electro-conductive particles 3 are dispersed in the electroconductive resin layer 2 and direct contact gas diffusion electrode 4 (See Figure 1/Col 6, lines 12-30). Thus, Ru-metal oxide particles directly contact the electrode 4.

FIG. 1



**2<sup>nd</sup> approach:** In addition to that, applicant has articulated that the reference “*fails to teach a metal oxide coating in communication with a reactant gas*”. Interestingly, applicant has admitted that “*The oxide layer, being sandwiched between the substrate and the resin layer, prevents contact between the oxide layer and the reactant gas*” (See amendment dated 11/03/06 at page 16, last sentence of 2<sup>nd</sup> full paragraph). This applicant’s statement or admission contributes to the position taken by the examiner because the oxide is formed on the surface of the metal substrate 1 facing the gas diffusion electrode 4. Accordingly, reactant gas diffuses through pinhole 8 in the resin layer 2 and contacts the oxide layer deposited between the resin layer 2 and the metal substrate 1. Since the oxide layer prevents contact between the reactant gas and the metal substrate, it can be said that the oxide layer is acting as a direct barrier therebetween. Meanwhile, the oxide layer per is in direct contact with the reactant gas, and therefore in communication therewith.

Stated alternatively, Gyoten et al teach that the oxide layer is situated between the metal substrate 1 and said electroconductive resin layer 2 (COL 8, lines 48-52/CLAIM 2). Notice also the presence of pin-hole 8 and gas diffusion electrode 4 (See FIGURE 1/COL 6, lines 12-30). Given that pin-hole 8 directly provides an open path therebetween, it can be said that reactant gas diffusing through gas diffusion electrode also diffuses through the electroconductive resin layer 2. Therefore, said reactant gas contacts or communicates with the oxide layer placed between the metal substrate 1 and said electroconductive resin layer 2.

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Raymond Alejandro/  
Primary Examiner, Art Unit 1795